**Section 5.5 — Green Computing and Embodied Energy**  
**Principle:** Use of Environment-Friendly Materials

**0.1 — One-line summary (Principle-Aligned):**  
Assessing and minimizing embodied energy emphasizes the selection and design of devices with environmentally-friendly materials to reduce overall environmental impact.

**0.2 — Two-line summary (Principle-Aligned):**  
Evaluating embodied energy exposes the hidden costs and environmental harms associated with manufacturing, shipping, packaging, and materials. Prioritizing devices made with eco-friendly materials, minimal packaging, and ethical labor practices is essential for truly green computing.

**0.3 — Key Concepts, Applications, and Relevance (Rich Rewrite):**  
The concept of embodied energy highlights the total energy—and environmental footprint—invested in a device from extraction of raw materials, through manufacturing, transportation, and packaging, before it ever reaches the user. Focusing on the use of environment-friendly materials at each stage is critical: rare earth metals, for example, require energy-intensive and polluting extraction, and their use should be minimized or sourced responsibly. Devices that require global shipping accumulate additional environmental costs—not just from the finished product’s delivery, but from the complex movement of components and materials around the world.

Packaging is another major factor: opting for minimalist, recyclable, or biodegradable packaging reduces waste and signals a manufacturer’s commitment to sustainability. The use of hazardous substances (such as PVC, brominated flame retardants, and heavy metals) should be actively avoided; instead, preference should be given to products free of toxic chemicals and those incorporating recycled or upcycled materials.

The social dimension cannot be ignored—labor abuses and unsafe working conditions in the supply chain often accompany unsustainable material choices. Environmentally-friendly procurement policies should therefore account for ethical sourcing as well as ecological impact.

In practical terms, environmentally conscious buyers should begin by seeking the smallest, lightest device that fulfills their requirements, as smaller devices generally have lower embodied energy and use fewer materials. However, size alone isn’t sufficient; careful attention must be paid to material composition, packaging, and supplier practices.

Adopting these strategies not only shrinks the carbon and material footprint of computing devices but also sets a precedent for sustainability across the industry, aligning every purchasing decision with the goal of minimizing ecological harm and encouraging manufacturers to improve their materials and processes.

**Section 6.1 — What Makes a Device Green?**  
**Principle:** Use of Environment-Friendly Materials

**0.1 — One-line summary (Principle-Aligned):**  
A truly green device is defined by its use of non-toxic, recyclable, and sustainably sourced materials at every stage of its life cycle.

**0.2 — Two-line summary (Principle-Aligned):**  
Green devices are distinguished not just by energy savings or size, but by minimizing harmful substances, maximizing recycled and recyclable materials, and ensuring ethical sourcing and responsible end-of-life handling. Selecting both suppliers and products must prioritize materials that reduce ecological and human harm throughout manufacturing, use, and disposal.

**0.3 — Key Concepts, Applications, and Relevance (Rich Rewrite):**  
Evaluating what makes a device “green” from a materials perspective means looking far beyond technical specs or headline energy ratings. The core priority is ensuring that all materials—plastics, metals, circuit boards, and even packaging—are chosen to minimize environmental damage and toxic exposure. This involves avoiding hazardous substances such as PVC, brominated flame retardants, and heavy metals like mercury and lead, while instead favoring recycled plastics, bio-based polymers, and components that can be safely reused or recycled.

Green credentials are not just about the device itself but are tightly linked to the supplier’s overall material sourcing and manufacturing processes. Suppliers who offer take-back programs and support product refurbishment or recycling are signaling a genuine commitment to environmental stewardship. Devices with longer lifespans, greater durability, and ease of repair further amplify material efficiency, delaying the entry of hazardous or non-recyclable materials into the waste stream.

Green packaging is another essential marker—preference must be given to products shipped in minimalist, recyclable, or compostable packaging rather than excessive plastic or chemically treated cardboard. Even documentation should be digital or reduced in physical form where possible.

Purchasing decisions must consider a comprehensive checklist: smaller and lighter devices (as they generally use less material), minimal and green packaging, products that meet or exceed recognized environmental standards, and manufacturers who transparently report on material sourcing, labor ethics, and waste handling. Supplier “green goodness”—their aggregate approach to materials and the environment—should weigh as heavily as the product specs themselves.

Ultimately, choosing devices based on the use of environment-friendly materials not only minimizes direct ecological harm but also drives market demand for responsible manufacturing. This approach contributes to a cleaner workplace, reduces toxic exposures, and ensures that every device purchased is a step toward a more sustainable, circular technology economy.

**Section 10.2 — A Resource Use Checklist**  
**Principle:** Use of Environment-Friendly Materials

**0.1 — One-line summary (Principle-Aligned):**  
Choosing and managing electronic resources must focus on minimizing toxic materials, maximizing the use of safe, sustainable components, and ensuring responsible sourcing and disposal.

**0.2 — Two-line summary (Principle-Aligned):**  
A resource use checklist rooted in environment-friendly materials spotlights the importance of selecting devices with minimal hazardous substances, avoiding toxic components like lead, mercury, PVC, and brominated flame retardants. Reducing e-waste and supporting companies with ethical sourcing, extended producer responsibility, and transparent, sustainable supply chains are essential for genuine green computing.

**0.3 — Key Concepts, Applications, and Relevance (Rich Rewrite):**  
When considering electronics through the lens of environment-friendly materials, every purchasing and disposal decision must account for the full spectrum of resource impacts—starting with material toxicity and extending to the entire supply chain and end-of-life treatment. Electronics are filled with substances known to be harmful: lead, mercury, brominated flame retardants, cadmium, hexavalent chromium, and PVC-coated cables all contribute to lasting pollution and pose health risks during both use and disposal.

Environmentally-responsible practice means intentionally seeking products designed with non-toxic, recyclable, and renewable materials—while avoiding devices heavy with hazardous chemicals or difficult-to-recycle plastics. Buyers must give preference to brands and suppliers that actively reduce or eliminate harmful substances, offer clear documentation of material choices, and support extended producer responsibility (EPR). EPR obligates manufacturers to take back products at end-of-life, ensuring safe recycling or disposal, and incentivizes designs that use fewer toxics and more recyclable components.

Exporting e-waste to unregulated environments, where unsafe recycling exposes vulnerable populations to toxins, must be condemned. Instead, reputable organizations and manufacturers that provide take-back schemes and verifiable recycling processes should be prioritized.

A comprehensive resource use checklist should include:

* Evaluating every device for the presence of hazardous materials and prioritizing safer alternatives
* Verifying the supplier’s commitments to EPR, green manufacturing, and ethical labor practices
* Preferring devices designed for easy disassembly and recycling, with minimized use of toxic substances
* Avoiding products that lack transparency about their material content or end-of-life management
* Supporting donation and refurbishment initiatives as a responsible alternative to disposal

Ultimately, applying this checklist ensures every resource decision advances a future where electronics are safer, cleaner, and less damaging to people and the planet. This sets a clear expectation for manufacturers and suppliers: environment-friendly materials are not optional—they are the standard for all responsible technology use and procurement.